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**GERAGHTY  
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*Environmental Services*

**WORK PLAN  
FOR A SITE INVESTIGATION  
FOR DEAD CREEK SECTOR B  
AND SITES L AND M,  
SAUGET - CAHOKIA, ILLINOIS**

August 1991

Prepared for

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**WORK PLAN  
FOR A SITE INVESTIGATION  
FOR DEAD CREEK SECTOR B  
AND SITES L AND M,  
SAUGET-CAHOKIA, ILLINOIS**

August 15, 1991

Geraghty & Miller, Inc. is submitting this Work Plan to Monsanto Company for a proposed site investigation at the Dead Creek Sites. The Work Plan was prepared in conformance with Geraghty & Miller's strict quality assurance/quality control procedures to ensure that the report meets the highest standards in terms of methods used and the information presented. If you have any questions or comments concerning this Work Plan, please contact one of the individuals listed below.

Respectfully submitted,

GERAGHTY & MILLER, INC.

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**WORK PLAN  
FOR A SITE INVESTIGATION  
FOR DEAD CREEK SECTOR B  
AND SITES L AND M, SAUGET-CAHOKIA, ILLINOIS**

**1.0 INTRODUCTION**

At the request of Monsanto Company, St. Louis, Missouri, Geraghty & Miller, Inc. has prepared this work plan for a site investigation at Dead Creek Sector B and Sites L and M, Sauget-Cahokia, Illinois. The purpose of the study is to characterize conditions at the sites by determining the nature and extent of sediment/fill materials that are present and estimate the volume of material affected by organic compounds and/or metals. Throughout this work plan, the site(s) will be referred to as Sector B, Site L and Site M, which were identified by the Illinois Environmental Protection Agency (IEPA) as Dead Creek Sector B, Sauget Site L, and Sauget Site M (Ecology & Environment [E&E], 1988). The study area is shown on Figures 1 and 2.

This work plan describes the scope of work associated with the sites investigations. Three project operation plans are provided as appendices. A field sampling plan (FSP), describing the sampling protocols, is presented in Appendix A. The quality assurance project plan (QAPP), providing procedures for assuring the quality of the analytical data, is contained in Appendix B. The health and safety plan (HASP) is provided in Appendix C and describes procedures to protect the health and safety of the investigation team.

**1.1 SCOPE OF WORK**

A field investigation will be conducted which will consist of a focused boring and sampling program. Specific testing locations and the recommended analyses at each of the three sites have been selected based upon historical information and previous investigations discussed in Sections 1.2.2 and 1.2.3. The field program will be conducted in two phases.

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A boring program will be conducted to characterize sediment/fill material at each of the sites and to determine its areal extent. After the nature and extent of the sediment/fill at each of the sites has been defined, a second phase of sampling will be undertaken to classify materials, reactivity, ignitability, corrosivity, and toxicity using the Toxicity Characteristic Leaching Procedure (TCLP).

## 1.2 SITE BACKGROUND

A description of the site locations, site histories, and previous investigations is presented in the following sections.

### 1.2.1 Site Location and Description

Dead Creek Sector B, and Sites L and M are located in Sauget and Cahokia, St. Clair County, Illinois. The sites are located on the north-central part of the Cahokia, Illinois-Missouri U.S. Geological Survey (USGS) topographic quadrangle (Figure 1). Dead Creek Sector B is about 2000 feet in length and lies between Queeny Avenue to the north and Judith Lane to the south. Sector B encompasses an area of about 230,000 square feet (ft<sup>2</sup>) (Figure 2). In general, the creek area consists of a narrow channel that is about 5 feet wide. Water levels in the creek vary, depending on precipitation and water table fluctuations. During periods of little precipitation and low water table, the creek becomes a dry ditch. The channel of the creek bed is flanked by a low bank on either side which may often be under water. The channel and the low banks are enclosed by steeper, heavily vegetated banks. Standing water cannot drain out of Sector B to other parts of Dead Creek because both the influent (north) and effluent (south) ends of Sector B have been sealed.

Sites L and M are located adjacent to Creek Sector B (Figure 2). Site L is located on the east side of Sector B and approximately 700 feet south of Queeny Avenue. Based on a figure in a report prepared by the IEPA (St. John, 1981), the site's (L) approximate dimensions are 70 feet by 150 feet. The subsequent study by an IEPA consultant (E&E,

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1988) indicates the dimensions of Site L to be 70 feet by 150 feet. The figures depict a site with dimensions of about 195 feet by 145 feet. This discrepancy is likely due to the site boundaries drawn by E&E, which included a larger area than the actual impoundment basin. Therefore, for the purposes of this study, the site boundaries are assumed to be those depicted on the E&E (1988) report figures. Site L includes a portion of the property owned by Metro Construction Company. The site is covered with black cinders and construction vehicles are parked across the area. Access to the site is not restricted.

Site M is adjacent to the southeast part of Sector B and it is about 200 feet north of Judith Lane. The site is a former pit that was formed by sand mining. Presently, the pit is filled with water at least 2 feet deep. Site M is connected to Creek Sector B by a drainage way which allows water to flow from the creek to the pit. The dimensions of Site M are about 335 feet by 235 feet. Site M, along with all of Creek Sector B, is surrounded by a chain-link fence which was installed by the U.S. Environmental Protection Agency (USEPA) to restrict access.

#### 1.2.2 Site History

Formally, Dead Creek provided drainage for part of the Mississippi floodplain and water in the creek flowed in a southwesterly course to the Prairie Dupont Floodway which ultimately discharged to the Cahokia Chute of the Mississippi River. However, Dead Creek, particularly Sector A (immediately north of Sector B) and Sector B have been a concern since the early 1970s when area residents filed complaints with the Cahokia Health Department regarding discharges to the creek (Ecology & Environment, 1988). As a result of these concerns, culverts on the north and south ends of the Sector B portion of the creek were sealed to prevent surface water from flowing freely into or out of that part of the creek. Additionally, the creek may have been affected by former pits or excavations (e.g., Sites L and M) adjacent to its banks (St. John, 1981). Since that time, several federal and state agencies have conducted surveys, site inspections, and studies of Dead Creek and adjacent former pit/excavation areas.

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Site L was used as a disposal impoundment basin by Harrold Waggoner and Company, a trucking firm which operated at the site from 1964 to 1974. Discharges to the impoundment at Site L began after 1971, after Harrold Waggoner and Company was cited by the IEPA for discharges directly into Dead Creek within Sector B. Ruan Trucking Company also used the impoundment basin for disposal purposes after they purchased the operation in 1974. Disposal activity at site L ceased after 1978 when the property was sold to Metro Construction Company, the site's present owner (E&E, 1988). The site is covered with cinders and serves as a depot for large construction machinery, along with adjacent areas.

Site M was a sand mining area excavated in the 1940s by H.H. Hall Construction Company. This area was mined prior to any residential development along Walnut Avenue, east of Site M. The E&E Report (1988) reported the owner of the property as Thomas Owen.

### 1.2.3 Previous Investigations

In 1980, the IEPA initiated an investigation of Dead Creek and adjacent areas as a result of complaints from local area residents. The IEPA study (St. John 1981) consisted of analyzing 31 soil samples (19 from Sector B) to determine the affect of disposal practices. Information from five hand auger and 12 drill rig boring locations was used to characterize local geologic conditions. In addition, surface water samples and ground-water samples were collected and analyzed. The study concluded that sediment samples collected from Dead Creek contained polychlorinated biphenyls (PCBs), organic compounds and metals. The report also concluded that ground water and surface water were also affected by organic and inorganic constituents.

In 1986, E&E initiated a remedial investigation (RI) on behalf of the IEPA at several sites in the Sauget area, which included Sector B and Sites L and M. In Sector B, E&E collected two surface water samples and five sediment samples from the north and south

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ends of site. A summary of the soil and sediment analytical data collected by E&E is provided in Tables 1 through 4.

Four borings were used by E&E (1988) to characterize conditions at Site L. Data from the borings indicate that the impoundment basin was excavated approximately eight feet into a deposit chiefly composed of sand with silt. The excavation was filled with material consisting of black cinders, clay and concrete. The contact between fill material and the underlying sand and silt deposits are believed to be an indication of the impoundment basin's extent. E&E reported that past disposal activities have affected sediment and ground-water quality. Constituents detected include benzene, toluene, phenols, and arsenic. PCBs were not detected.

In 1986, E&E collected two surface water and five sediment samples in the excavated area of Site M. The results from these samples indicate that the site sediments have been impacted by past disposal activities. However, it is not clear whether or not Site M was a disposal area or was affected by surface water drainage from Dead Creek. Surface water samples did not exhibit constituent concentrations indicative of disposal impacts.

The Advent Group, Inc. completed a site investigation/remedial alternatives evaluation for Creek Sector A (1990) which is located north of Sector B on property owned by Cerro Copper Products Co. The Advent Group study consisted of a field program initiated in July 1989 to characterize and define the constituents in Creek Sector A and determine the volume of sediments requiring remedial action. Ninety nine sediment samples were collected from 34 soil borings along ten transects of Sector A. The report concluded that fill and creek channel sediments ranged in thickness from one to 15 feet and a half foot to 11 feet, respectively. These materials contained concentrations of organic compounds including PCBs as well as inorganic analytes (metals). It was estimated that approximately 19,500 cubic yards of creek bottom sediments was affected by chemical constituents.

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## **2.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA**

This section describes the physical setting of the sites. Discussed below are land use, topography and drainage, climate, and geology.

### **2.1 LAND USE**

The Sauget area (north of the study area) is heavily industrialized. More than half of the land use in the town of Sauget is industrial. The Sauget area is within a major transportation corridor provided by the Mississippi River, numerous interstate highways, and a large railroad center. A number of industrial properties are north of Sector B and they include Cerro Copper Products Co., Monsanto Company, Big River Zinc, Midwest Rubber Company, Mobil Oil Company, and Sterling Steel Foundry. Land use in Cahokia (southern part of the study area) is residential, commercial and agricultural. Immediately adjacent to the central and southern portions of Sector B are cultivated fields. Site M is adjacent to a small residential area off of Walnut Street and Judith Lane.

### **2.2 TOPOGRAPHY AND DRAINAGE**

The study area is located on the flood plain of the Mississippi River and is within the physiographic region known as the American Bottoms. Generally, the flood plain's land surface lies between elevations of 400 and 445 feet above National Geodetic Vertical Datum (NGVD) and, locally, the sites are about 405 feet above NGVD. The topography of the area is predominantly flat with the exception of the steep bank of Dead Creek. Surface runoff from the area flows toward Dead Creek - Sector B, which ultimately drains into Site M.

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## 2.3 CLIMATE

The climate of the site(s) area is continental with hot, humid summers and mild winters. Periods of extreme cold are of short duration. The average annual rainfall in the area for the period from 1903 to 1983 was 35.4 inches; however, precipitation increased to 39.5 inches per year during the period from 1963 to 1988 (Southwestern Illinois Metropolitan and Regional Planning Commission (1983). The average annual temperature is 56°F; the highest average monthly temperature (79°F) occurs in July and the lowest average monthly temperature (32°F) occurs in January.

## 2.4 REGIONAL AND SITE GEOLOGY

The site(s) is situated on the flood plain of the Mississippi River (Figure 1). The flood plain is locally named the American Bottoms, and contains unconsolidated valley fill deposits composed of recent alluvium (Cahokia Alluvium) which overlies glacial material (Henry Formation). Published information indicates that these unconsolidated deposits are underlain by bedrock of Pennsylvanian and Mississippian age which consists of limestone and dolomite with lesser amounts of sandstone and shale.

The Cahokia Alluvium (recent deposits) consists of unconsolidated, poorly sorted, fine-grained materials with some local sand and clay lenses. These recent alluvium deposits unconformably overlie the Henry Formation which is Wisconsinian glacial outwash in the form of valley-train deposits. The Henry Formation is about 100 feet thick. These valley-train materials are generally medium to coarse sand and gravel and increase in grain size with depth.

During the various drilling programs conducted on-site, the alluvium underlying Dead Creek has been characterized as a silt with local clay and sand lenses (St John 1981). The deposits tend to become coarser with depth. The Advent Group (1990) categorized the stratigraphy in Sector A as being comprised of the four following units in descending order:

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fill material, fluidized creek bottom sediments, Cahokia Formation, and Henry Formation. The fill material is composed of sand and silt matrix intermixed with concrete, bricks, road aggregate, rags, slag, and vitreous pellets. The fluidized creek bottom sediments are saturated silts with organic matter. The Cahokia and Henry formations have been described similar to that discussed above.

### **3.0 INVESTIGATION FIELD ACTIVITIES**

A boring program will be conducted to characterize the sediment/fill at each of the sites. Described below are the different sampling strategies and rationales for Sector B, and Sites L and M. After the boring programs discussed below are complete, a phase II program will be initiated to classify the material.

Access to Sector B and Site M will be gained through lockable gates that will be installed at four locations. Gate locations will be chosen to facilitate movement into and out of the sites which is hindered by steep banks within Sector B and Site M. Gravel fill will be brought onto the site to aid in the construction of access ramps. Land clearing of small trees and underbrush will be required to move within Sector B.

#### **3.1 SECTOR B BORING PROGRAM**

Sediment/fill samples will be collected along ten profiles (transects) within the creek bed, spaced approximately 200 feet apart, throughout the 2,000-foot length of Sector B. As shown on Figure 3, three borings are proposed for each profile similar to the study conducted in Sector A (Advent Group 1990). All borings will be drilled to determine the thickness of the sediment/fill in the creek and will be spaced, within a given transect, 15 to 20 feet apart. The limits of the creek bottom sediments/fill will be determined visually by a field geologist during the drilling operations. It is anticipated that the borings within the creek bed will be drilled to a maximum depth of about 7 feet. Samples will be collected using a 5-foot continuous tube sampler, and 3-inch diameter split spoons will be used if

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recovery is poor in the fine sandy sediments. Both methods will provide a continuous record of the geology, as well as a sufficient volume of material for analysis. All samples will be described by the Geraghty & Miller field geologist who will record sample location, depth, grain size distribution, and color. Each sample will also be screened in the field for the presence of volatile organic compounds (VOCs) using a photoionization detection (PID) instrument.

Based on appearance and PID measurements, we propose to select one sediment/fill sample per borehole for chemical analysis. Each sample will be selected from a 2-foot interval that best characterizes sediment/fill in the creek. One sediment/fill sample per transient will be analyzed for the USEPA target compound list/ target analyte list (TCL/TAL) parameters. The remainder of the samples from the transect will be analyzed for TAL parameters (metals) and PCBs. Appropriate quality assurance/quality control (QA/QC) samples will also be collected. The analytical data from the sediment/fill will be used to delineate any impacted areas, as well as provide an estimate of the volume of sediment/fill present. Each borehole will be sealed with a mixture of drill cuttings and bentonite grout and the borehole's location and land surface elevation will be surveyed by a licensed land surveyor. All drilling equipment will be steam cleaned after each borehole and all sampling equipment will be decontaminated with a laboratory-grade detergent and potable water before the collection of each sample.

At present, we propose to use an all-terrain vehicle (ATV) drill rig for the entire program. However, in some areas, it may be necessary to pump off standing water to provide suitable sampling conditions. If there is a great deal of standing water, and it is not feasible to pump it off to another part of the creek, the drill rig can be mounted on a reinforced aluminum pontoon that can be anchored to the creek channel bank with steel cables. This drilling method was used in Creek Sector A by Advent Group (1990).

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### 3.2 SITE L BORING PROGRAM

To define the lateral and vertical extent of the fill material at Site L, additional borings are required to supplement the data collected previously (E&E 1988). Since this site is relatively small (70 feet by 150 feet), only six borings are necessary to categorize the nature and extent of the fill material. These borings will be drilled at strategic locations to supplement the existing borings drilled during the E&E investigation (1988) (Figure 4).

At each boring location, we propose to collect continuous samples, using a 5-foot tube sampler or a 3-inch diameter split-spoon, to delineate the bottom of the fill. Five borings will be drilled at the perimeter of the former impoundment (as identified by E&E) to determine its actual boundaries. A visual examination by the field geologist will be used to determine whether or not the boring is within the former impoundment basin. If necessary, boring locations will be adjusted to ascertain the former impoundment basin boundaries and characterize the fill material. The remaining boring will be drilled near the center of Site L to determine maximum fill thickness. One sample per borehole (six boreholes) will be submitted for laboratory analysis. The sample that best characterizes the fill material will be selected for analysis. The criteria for sample selection will be visual indicators such as discoloration and high PID readings. Each sample will be limited to a 2-foot section of the continuous core. At two of the six borings, the samples will be analyzed for TCL/TAL parameters. At the remaining four borings, samples will be analyzed for PCBs, TAL metals, and TCL VOCs. Each borehole will be sealed and surveyed as described for Dead Creek - Sector B.

### 3.3 SITE M BORING PROGRAM

At Site M, sediment samples will be collected from three locations from beneath the ponded water (Figure 5). To obtain the samples, a soil boring drill rig supported by the aluminum pontoon previously described in Section 3.1 may be used, or samples may be collected from a boat. This method of supporting a drill rig on surface water has been used

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successfully at other sites (Advent Group, Inc. 1990). If the samples are collected from a boat, 4-inch diameter steel casing will be driven into the pond sediments and split-spoon samples will be obtained from within the casing to determine the thickness of the sediments. One sample for laboratory analysis will be selected from each of the three locations at the 0 to 2-foot interval. At one location, the sample will be analyzed for TCL/TAL parameters, and at the other two locations, each sample will be analyzed for PCBs and TAL metals. We have assumed that the pit bottom is at a maximum depth of 10 feet below the pond level. Sample selection protocols and decontamination procedures will be the same as was described for Dead Creek - Sector B.

### **3.4 PHASE II INVESTIGATION**

Once the chemical nature of the sediment/fill material has been determined, approximately five samples will be collected during a second phase of field work to classify the material. Each of these samples will be analyzed for reactivity, corrosivity, ignitability, and toxicity using the TCLP.

### **4.0 PROJECT ORGANIZATION AND SCHEDULING**

All field activities will be conducted in accordance with specific field, analytical, and health and safety protocols outlined in the FSP (Appendix A), the QAPP (Appendix B), and the HASP (Appendix C), respectively. Primary responsibility for the study will be shared by the Geraghty & Miller project officer and project manager (see Figure 6). They will be responsible for the scheduling and coordination of all Geraghty & Miller personnel on the project and for providing technical assistance for all activities which are directly related to the study. The Geraghty & Miller QA/QC advisor will have the responsibility for all QA/QC review to ensure that work is performed in accordance with established protocols.

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The schedule for the sites investigation and evaluation is shown on Figure 7. The investigation will begin upon notice of approval of this work plan and authorization to proceed from Monsanto Company. A 30-week schedule is shown for performance of tasks and development/submittal of preliminary and final reports.

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## **5.0 REFERENCES**

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TABLES

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Table 1. Summary of Volatile Organic Compounds Detected in Sediments and Soils from Dead Creek Sector B, and Sites L and M, Sauget - Cahokia, Illinois

	Sector B				
Sample Identification:	DC-L1-02	DC-SD-14	DC-SD-18	DC-SD-19	DC-SD-20
Sample Depth:	(0-0.5')	(2-3')	(0-0.5')	(0-0.5')	(1.5-2')
Sample Date:	11/5/86	11/5/86	11/5/86	11/5/86	11/5/86
Parameter (concentrations in ppb)					
Methylene chloride	11000 B	2200	12000	13000	14000
Acetone	15000 B	820	4180	10000	6100
Chloroform	--	--	--	--	--
2-Butanone (MEK)	21000 B	510	14000	14000	10000
Benzene	--	87	--	--	--
4-Methyl-2-pentanone	--	220	--	--	--
2-Hexanone	--	--	--	52000	--
Toluene	--	810	--	--	--
Chlorobenzene	--	5200	--	--	--
Ethylbenzene	--	3600	--	--	--
Total Xylenes	--	980	--	--	--

Source of data - Ecology &amp; Environment (1988).

- B Compound detected in blank samples.  
 J Estimated value. Result is less than the specified detection limit, but greater than zero.  
 - Not detected.  
 NA Not analyzed.  
 ppb Parts per billion.

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Table 1. Summary of Volatile Organic Compounds Detected in Sediments and Soils from Dead Creek Sector B, and Sites L and M, Sauget - Cahokia, Illinois

Parameter (concentrations in ppb)	Site L				
	Sample Identification:		Sample Depth:		Sample Date:
	DC-L1-02 (5-10')	DC-L2-03 (5-15')	DC-L3-04 (5-15')	DC-L4-09 (10-20')	
	12/12/86	12/12/86	12/12/86	12/17/91	12/17/91
Methylene chloride	14 B	141 B	2278 B	8	5 J
Acetone	907 B	449 B	4537 B	32 B	81 B
Chloroform	-	-	20253	96	49
2-Butanone (MEK)	16	-	10000 B	16 B	-
Benzene	-	141	4177	7 J	4 J
4-Methyl-2-pentanone	8 J	167	-	68 B	49 B
2-Hexanone	-	-	-	-	-
Toluene	-	2179	26582	93	-
Chlorobenzene	-	-	-	-	-
Ethylbenzene	-	40 J	-	-	-
Total Xylenes	-	179	670 J	-	-

Source of data - Ecology &amp; Environment (1988).

B Compound detected in blank samples.

J Estimated value. Result is less than the specified detection limit, but greater than zero.

- Not detected.

NA Not analyzed.

ppb Parts per billion.

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Table 1. Summary of Volatile Organic Compounds Detected in Sediments and Soils from Dead Creek Sector B, and Sites L and M, Sauget - Cahokia, Illinois

Parameter (concentrations in ppb)	Site M			
	Sample Identification:			
	Sample Depth: Sample Date:	DC-SD-15 (0-0.5') 11/5/86	DC-SD-16 (0-0.5') 11/5/86	DC-SD-17 (0-0.5') 11/5/86
Methylene chloride		7800 B	10000 B	8400 B
Acetone		4900 B	5100 B	5600 B
Chloroform		-	-	-
2-Butanone (MEK)		11000	14000	13000
Benzene		-	-	-
4-Methyl-2-pentanone		-	-	-
2-Hexanone		-	-	-
Toluene		-	-	-
Chlorobenzene		-	-	-
Ethylbenzene		-	-	-
Total Xylenes		-	-	-

Source of data - Ecology &amp; Environment (1986).

B Compound detected in blank samples.  
 J Estimated value. Result is less than the specified detection limit, but greater than zero.  
 - Not detected.  
 NA Not analyzed.  
 ppb Parts per billion.

MCA 0156888

VOCDEAD.XLS

CIVILILITATION



Table 2. Summary of Semivolatile Organic Compounds Detected in Sediments and Soils from Dead Creek Sector B, and Sites L and M, Sauget - Cahokia, Illinois.

Sector B						
Sample Identification:	DC-SD-13	DC-SD-14	DC-SD-18	DC-SD-19	DC-SD-20	
Sample Depth:	(0-0.5')	(2-3')	(0-0.5')	(0-0.5')	(1.5-2')	
Sample Date:	11/5/86	11/5/86	11/5/86	11/5/86	11/5/86	
Parameter						
(concentrations in ppb)						
Acenaphthene	-	-	-	-	-	
4-Nitrophenol	-	2600 J	-	-	-	
Diethylphthalate	-	-	-	-	-	
Flourene	-	3900 J	-	-	-	
Hexachlorobenzene	-	-	-	1900	210 J	
Pentachlorophenol	-	-	-	940 J	370 J	
Phenanthrene	-	15000 J	-	-	-	
Di-n-butyl phthalate	-	-	200 J	-	280 J	
Fluoranthene	-	11000 J	-	-	-	
Pyrene	-	13000 J	1400 J	-	91 J	
Butyl Benzyl phthalate	-	-	830 J	-	-	
Benzo (a) Anthracene	-	-	430 J	-	-	
bis(2-Ethylhexyl) phthalate	9900 J	9500 J	5300	-	95 J	
Chrysene	-	-	1200 J	-	180 J	
Di-n-octyl phthalate	-	2600 J	940 J	-	96 J	
Benzo (b) fluoranthene	-	3400 J	-	2400	-	
Benzo (k) fluoranthene	720 J	-	1500 J	-	410 J	
Benzo (a) pyrene	1100 J	1800 J	490 J	310 J	95 J	
Ideno (1,2,3-cd)perylene	-	-	850 J	1400 J	200 J	
Dibenz (a,h) anthracene	-	-	-	390 J	-	
Phenol	-	-	1400 J	1800 J	210 J	
2-Chlorophenol	-	-	-	-	-	
1,4-Dichlorobenzene	-	220000	-	-	-	
1,2-Dichlorobenzene	-	17000 J	-	130 J	-	
4-Methylphenol	-	-	-	-	-	
Nitrobenzene	-	-	-	-	-	
1,2,4-Trichlorobenzene	-	5400 J	-	390 J	76 J	
Napthalene	400 J	9500 J	190 J	120 J	-	
2-Methylnapthalene	-	8400 J	-	-	-	

Source of data - Ecology &amp; Environment (1988).

B Compound detected in blank samples.  
 J Estimated value. Result is less than the specified detection limit, but greater than zero.  
 - Not detected.  
 NA Not analyzed.  
 ppb Parts per billion.

MCA 0156889

SEMIDEAD.XLS

GERAGHTY &amp; MILLER, INC.

EPA/CEPRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE

Table 2. Summary of Semivolatile Organic Compounds Detected in Sediments and Soils from Dead Creek Sector B, and Sites L and M, Sauget - Cahokia, Illinois.

Parameter (concentrations in ppb)	Site L				
	Sample Identification:	DC-L1-02	DC-L2-03	DC-L3-04	DC-L4-09
	Sample Depth:	(5-10')	(5-15')	(5-15')	(10-20')
	Sample Date:	12/12/86	12/12/86	12/12/86	12/17/86
Parameter (concentrations in ppb)	DC-L4-10				
	(10-20')				
Parameter (concentrations in ppb)	12/17/86				
	12/17/86				
Acenaphthene	-	-	-	-	-
4-Nitrophenol	-	44 J	-	-	-
Diethylphthalate	-	-	-	-	310 J
Flourene	-	-	-	-	-
Hexachlorobenzene	-	-	-	-	-
Pentachlorophenol	-	11538	56228	-	-
Phenanthrene	-	802	1772 J	-	-
Di-n-butyl phthalate	171 J	372 J	2704	-	-
Fluoranthene	-	448	-	-	-
Pyrene	-	282 J	-	-	-
Butyl Benzyl phthalate	-	-	-	-	-
Benzo (a) Anthracene	-	-	911 J	-	-
bis(2-Ethylhexyl) phthalate	-	1217	-	750	1297
Chrysene	-	205 J	-	-	-
Di-n-octyl phthalate	-	-	-	-	-
Benzo (b) fluoranthene	-	-	-	-	-
Benzo (k) fluoranthene	-	-	-	-	-
Benzo (a) pyrene	-	-	-	-	-
Ideno (1,2,3-cd)perylene	-	-	-	-	-
Dibenz (a,h) anthracene	-	-	-	-	-
Phenol	-	346 J	1519 J	-	-
2-Chlorophenol	-	-	2152	-	-
1,4-Dichlorobenzene	-	-	215 J	-	-
1,2-Dichlorobenzene	-	-	-	-	-
4-Methylphenol	-	88 J	1089 J	-	-
Nitrobenzene	-	-	-	-	49 J
1,2,4-Trichlorobenzene	-	-	-	-	-
Napthalene	-	154 J	532 J	-	-
2-Methylnapthalene	-	333 J	1000 J	-	-

Source of data - Ecology &amp; Environment (1988).

B Compound detected in blank samples.  
 J Estimated value. Result is less than the specified detection limit, but greater than zero.  
 - Not detected.  
 NA Not analyzed.  
 ppb Parts per billion.

MCA J15689J

SEMIDEAD.XLS

GERAGHTY &amp; MILLER, INC.

EPA/CEPRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE

Table 2. Summary of Semivolatile Organic Compounds Detected in Sediments and Soils from Dead Creek Sector B, and Sites L and M, Sauget - Cahokia, Illinois.

	Site M		
Sample Identification:	DC-SD-15	DC-SD-16	DC-SD-17
Sample Depth:	(0-0.5')	(0-0.5')	(0-0.5')
Sample Date:	11/5/86	11/5/86	11/5/86
Parameter (concentrations in ppb)			
Acenaphthene	-	-	-
4-Nitrophenol	-	-	-
Diethylphthalate	-	-	-
Flourene	-	-	-
Hexachlorobenzene	-	-	-
Pentachlorophenol	-	-	-
Phenanthrene	-	-	-
Di-n-butyl phthalate	580 B	570 BJ	580 J
Fluoranthene	-	-	-
Pyrene	-	-	-
Butyl Benzyl phthalate	-	-	-
Benzo (a) Anthracene	-	-	-
bis(2-Ethylhexyl) phthalate	-	540 J	150 J
Chrysene	-	-	-
Di-n-octyl phthalate	120 J	270 J	-
Benzo (b) fluoranthene	-	-	-
Benzo (k) fluoranthene	-	-	-
Benzo (a) pyrene	-	-	-
Ideno (1,2,3-cd)perylene	-	-	-
Dibenz (a,h) anthracene	-	-	-
Phenol	-	-	-
2-Chlorophenol	-	-	-
1,4-Dichlorobenzene	-	-	-
1,2-Dichlorobenzene	-	-	-
4-Methylphenol	-	-	-
Nitrobenzene	-	-	-
1,2,4-Trichlorobenzene	-	-	-
Napthalene	-	-	-
2-Methylnapthalene	-	-	-

Source of data - Ecology &amp; Environment (1988).

B Compound detected in blank samples.  
 J Estimated value. Result is less than the specified detection limit, but greater than zero.  
 - Not detected.  
 NA Not analyzed.  
 ppb Parts per billion.

MCA 0156891

SEMIDEAD XLS

GERAGHTY &amp; MILLER, INC.

Table 3. Summary of Pesticide and PCB Compounds Detected in Sediments and Soils from Dead Creek Sector B and Site M, Sauget, Cahokia, Illinois.

Sector B					
Sample Identification:	DC-SD-13	DC-SD-14	DC-SD-18	DC-SD-19	DC-SD-20
Sample Depth:	(0-0.5')	(2-3')	(0-0.5')	(0-0.5')	(1.5-2')
Sample Date:	11/5/86	11/5/86	11/5/86	11/5/86	11/5/86
Parameter (concentrations in ppb)					
Aroclor-1242	--	--	--	--	--
Aroclor-1248	--	480000 C	--	--	--
Aroclor-1254	--	--	--	141000 C	16000 C
Aroclor-1260	10300 J	66000 C	7700	34000 JC	5600 JC
PCBs (Total)	NA	NA	NA	NA	NA

Source of data - Ecology &amp; Environment (1988).

C Result confirmed by GC/MS.  
 J Estimated value. Result is less than the specified detection limit, but greater than zero.  
 - Not detected.  
 NA Not analyzed.  
 ppb Parts per billion.

MCA J156892

PCBDEAD.XLS

GERAGHTY + MILLER INC

Table 3. Summary of Pesticide and PCB Compounds Detected in Sediments and Soils from Dead Creek Sector B and Site M, Sauget - Cahokia, Illinois

	Site M		
Sample Identification:	DC-SD-15	DC-SD-16	DC-SD-17
Sample Depth:	(0-0.5)	(0-0.5)	(0-0.5)
Sample Date:	11/5/86	11/5/86	11/5/86
Parameter (concentrations in ppb)			
Aroclor-1242	-	20000	
Aroclor-1248	660	8830	5200
Aroclor-1254	670	-	4200
Aroclor-1260	430 J	-	2700 J
PCBs (Total)	-	-	-

Source of data - Ecology &amp; Environment (1986).

C Result confirmed by GC/MS.  
 J Estimated value. Result is less than the specified detection limit, but greater than zero.  
 - Not detected.  
 NA Not analyzed.  
 ppb Parts per billion.

MCA 0156893

Table 4. Summary of Inorganic Compounds Detected in Sediments and Soils from Dead Creek Sector B, and Sites L and M, Sauget - Cahokia, Illinois

Parameter (concentrations in ppb)	Sector B			
	Sample Identification: Sample Depth: Sample Date:	DC-SD-13 (0-0.5') 11/5/86	DC-SD-14 (2-3') 11/5/86	DC-SD-18 (0-0.5') 11/5/86
Aluminum		4800	6380	5380
Antimony		-	-	-
Arsenic		14 R	20 R	16 R
Barium		410	1110	467
Beryllium		-	-	-
Boron		-	-	-
Cadmium		22	36	24
Chromium, trivalent		62	153	79
Cobalt		6.6	9.2	6
Copper		8740 *	6700	8640 *
Iron		18400	18600	16300
Lead		853	931	983
Magnesium		NA	NA	NA
Manganese		197	153	218
Mercury		0.73	1.3	0.9
Nickel		56 R*	502 R*	1520 R*
Selenium		3.3	4.1	2
Silver		10	11	15
Thallium		-	-	4
Tin		32	28	16
Vanadium		23	27	48
Zinc		3310	6850	11900
Cyanide		-	3.8	-

Source of data - Ecology &amp; Environment (1988).

- \* Duplicate analysis not with in control limits.
- R Spike sample recovery not with in control limits.
- Not detected
- NA Not analyzed
- ppb Parts per billion

INDEAD.XLS

CHRYSLER VULCAN

MCA 0156894

Table 4 Summary of Inorganic Compounds Detected in Sediments and Soils from Dead Creek Sector B, and Sites L and M, Saugel - Cahokia, Illinois

Parameter (concentrations in ppb)	Site L			
	Sample Identification: Sample Depth: Sample Date:	DC-L1-02 (5-10') 12/12/86	DC-L2-03 (5-15') 12/12/86	DC-L3-04 (5-15') 12/12/86
Aluminum		10897	5205	7380
Antimony		-	32	-
Arsenic		5 *	-	172
Barium		197	192	192
Beryllium		-	-	-
Boron		-	-	-
Cadmium		-	6	-
Chromium, trivalent		16	15	10
Cobalt		6	9	9
Copper		12	105	141
Iron		18053	5564	11899
Lead		9 *	106	41
Magnesium		NA	NA	NA
Manganese		255	44	149
Mercury		-	-	0.1
Nickel		21	408	2392
Selenium		-	-	-
Silver		-	-	-
Thallium		-	-	-
Tin		-	-	-
Vanadium		25	10	19
Zinc		59	144	166
Cyanide		NA	NA	NA
				1378
				68 *
				142
				-
				-
				3
				-
				101
				1446
				5 *
				NA
				10
				-
				93
				-
				-
				-
				-
				11
				NA

Source of data - Ecology &amp; Environment (1988).

- \* Duplicate analysis not with in control limits.
- R Spike sample recovery not with in control limits.
- Not detected.
- NA Not analyzed
- ppb Parts per billion

INODEAD.XLS

G E R M A N Y - A M B I E N T

MCA 0156895

Table 4. Summary of Inorganic Compounds Detected in Sediments and Soils from Dead Creek Sector B, and Sites L and M, Sauget - Cahokia, Illinois

	Site M		
Sample Identification:	DC-SD-15	DC-SD-16	DC-SD-17
Sample Depth:	(0-0.5')	(0-0.5')	(0-0.5')
Sample Date:	11/5/86	11/5/86	11/5/86
Parameter (concentrations in ppb)			
Aluminum	6560	2430	7510
Antimony	--	--	--
Arsenic	3.6 R	12 R	16 R
Barium	158	131	196
Beryllium	--	--	--
Boron	--	--	--
Cadmium	1.5	11	8
Chromium, trivalent	15	37	53
Cobalt	7.7	7.2	5
Copper	167 *	1270	1780 *
Iron	11100	26000	14400
Lead	26	65	71
Magnesium	NA	NA	NA
Manganese	100	97	139
Mercury	0.13	0.56	0
Nickel	356 R*	258 R*	309 R*
Selenium	--	--	--
Silver	--	--	--
Thallium	--	--	--
Tin	--	23	--
Vanadium	19	--	19
Zinc	868	872	1010
Cyanide	--	--	--

Source of data - Ecology &amp; Environment (1988)

- \* Duplicate analysis not with in control limits.
- R Spike sample recovery not with in control limits.
- Not detected.
- NA Not analyzed.
- ppb Parts per billion.



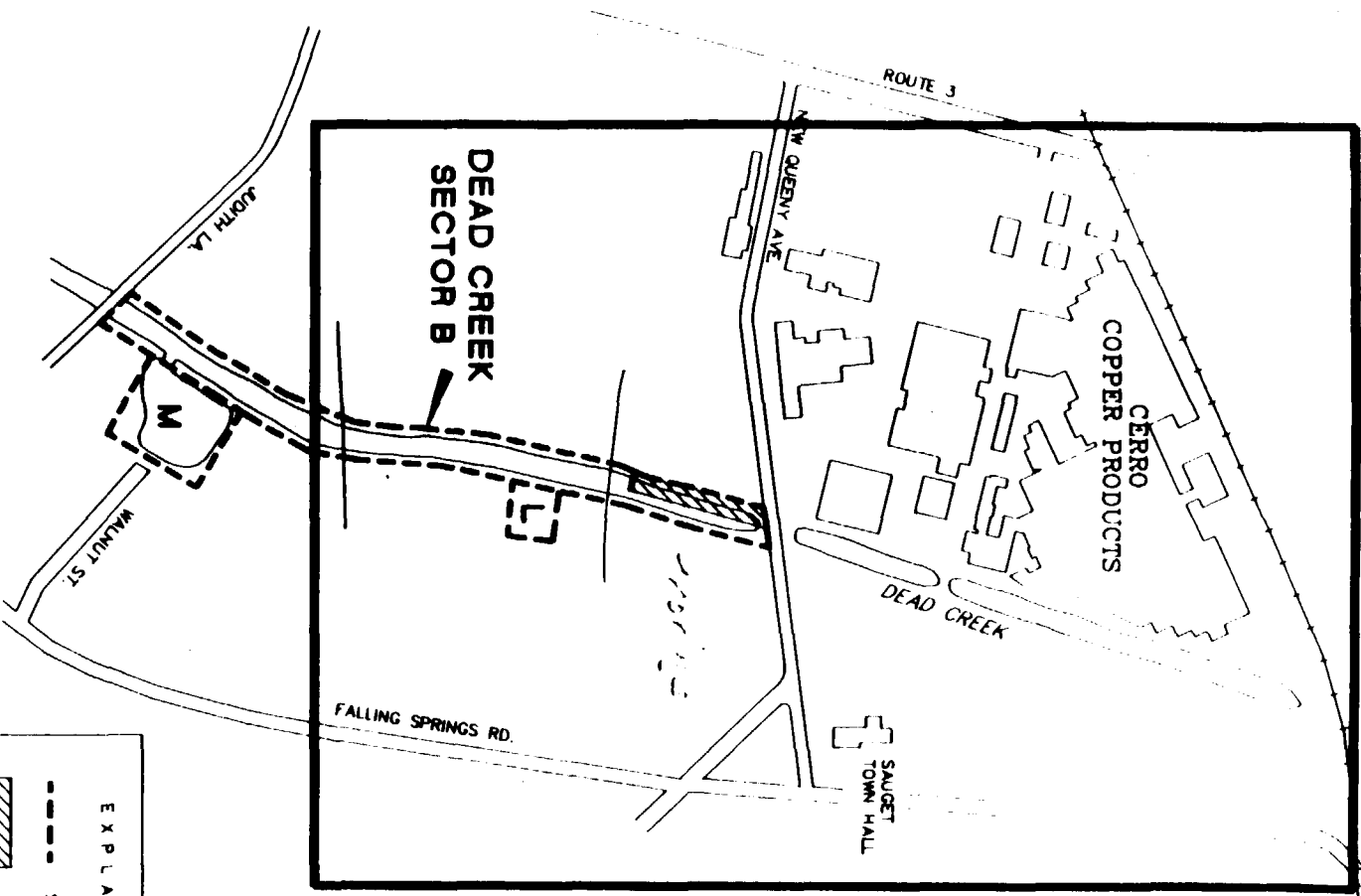
FIGURES

MCA 0156897

EPA/CEPRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE



# AREA I



EXPLANATION	
---	SITE BOUNDARY
▨	NO ACCESS AREA



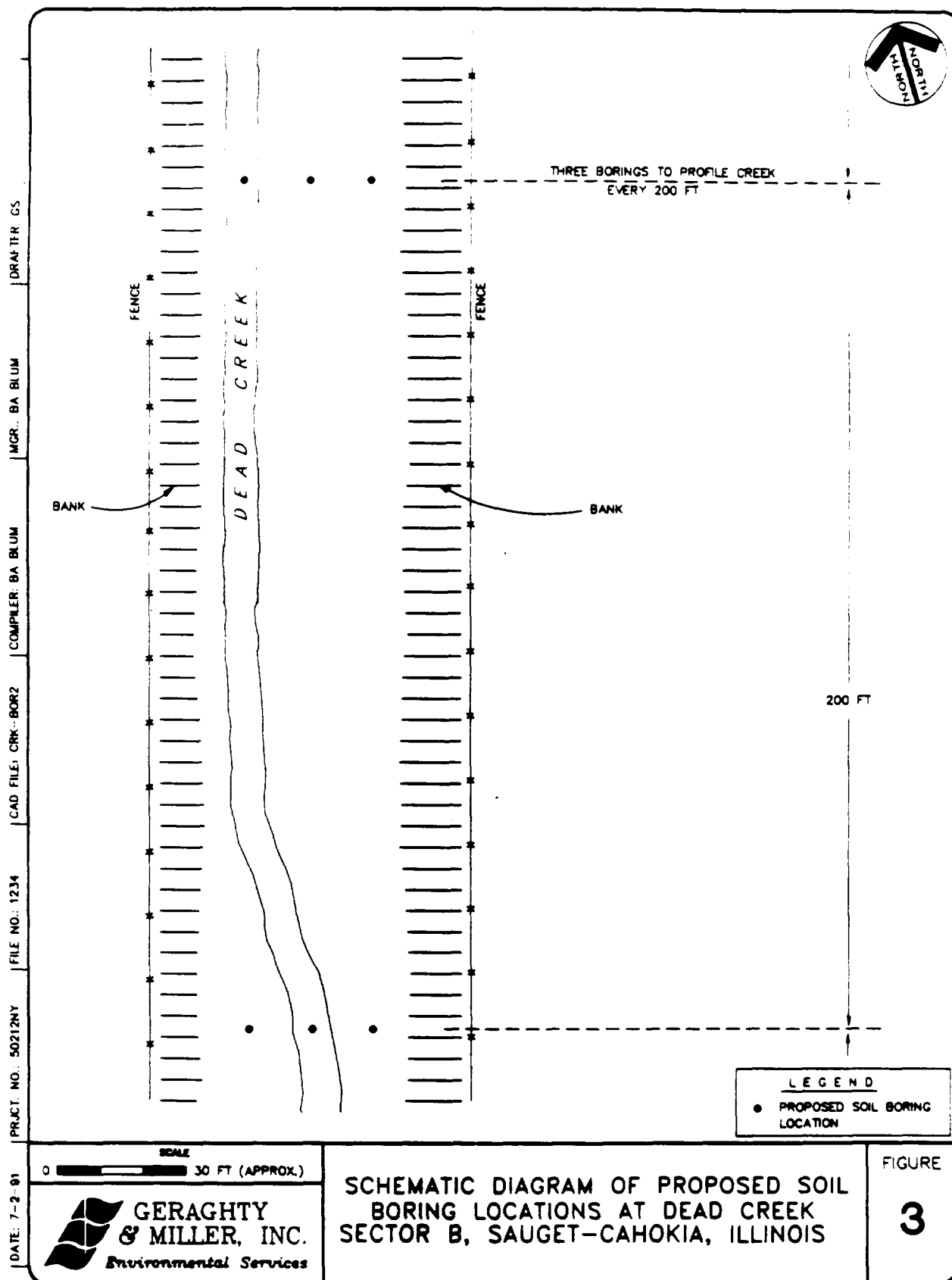
LOCATION OF STUDY AREAS, DEAD CREEK  
SECTOR B AND SITES L AND M,  
SAUGET-CAHOKIA, ILLINOIS

2

FIGURE

DATE: 8-6-91 PRJCT. NO.: NY80501 FILE NO.: 1234 CAD FILE: SDYAREA7 COMPILER: D COLTON MGR: D COLTON DRAFTER: G S

MCA .156299



MCA C156900

DRAFTER: GS

APPROVED: BB

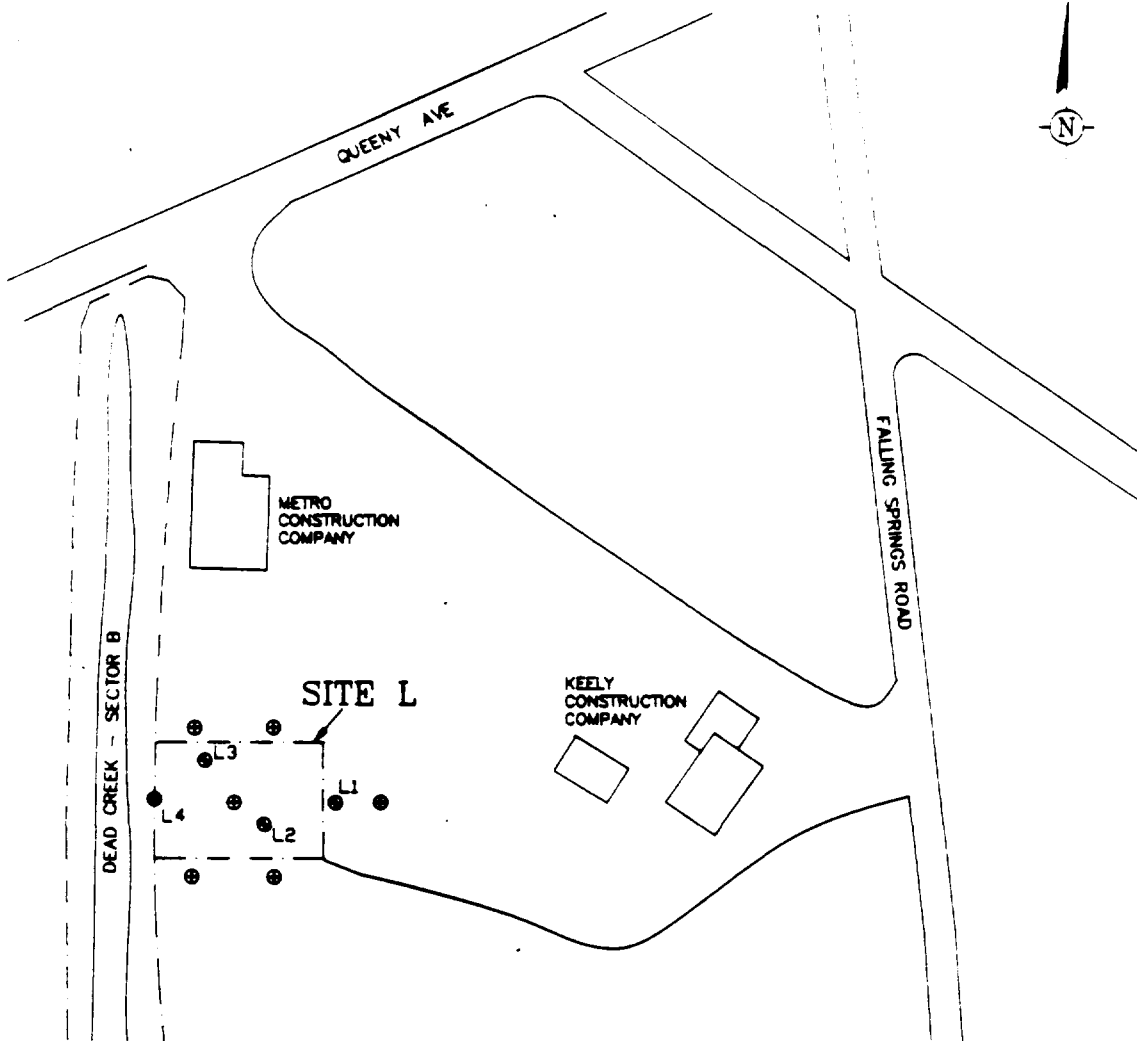
CHECKED: AN

DRAWING: SED-S-L

FILE NO.: 1444

PROJECT NO.: NY80501

DWG DATE: 8-8-91



0 200 FT

EXPLANATION

- LOCATION OF EXISTING EME WELL
- LOCATION OF EXISTING EME SOIL BORING
- PROPOSED GMM SOIL BORING LOCATION
- SITE BOUNDARY



SEDIMENT SAMPLING LOCATIONS  
AT SITE L, SAUGET, ILLINOIS

FIGURE

4

MCA 0156901

DRAFTER: GS

APPR: LD: BB

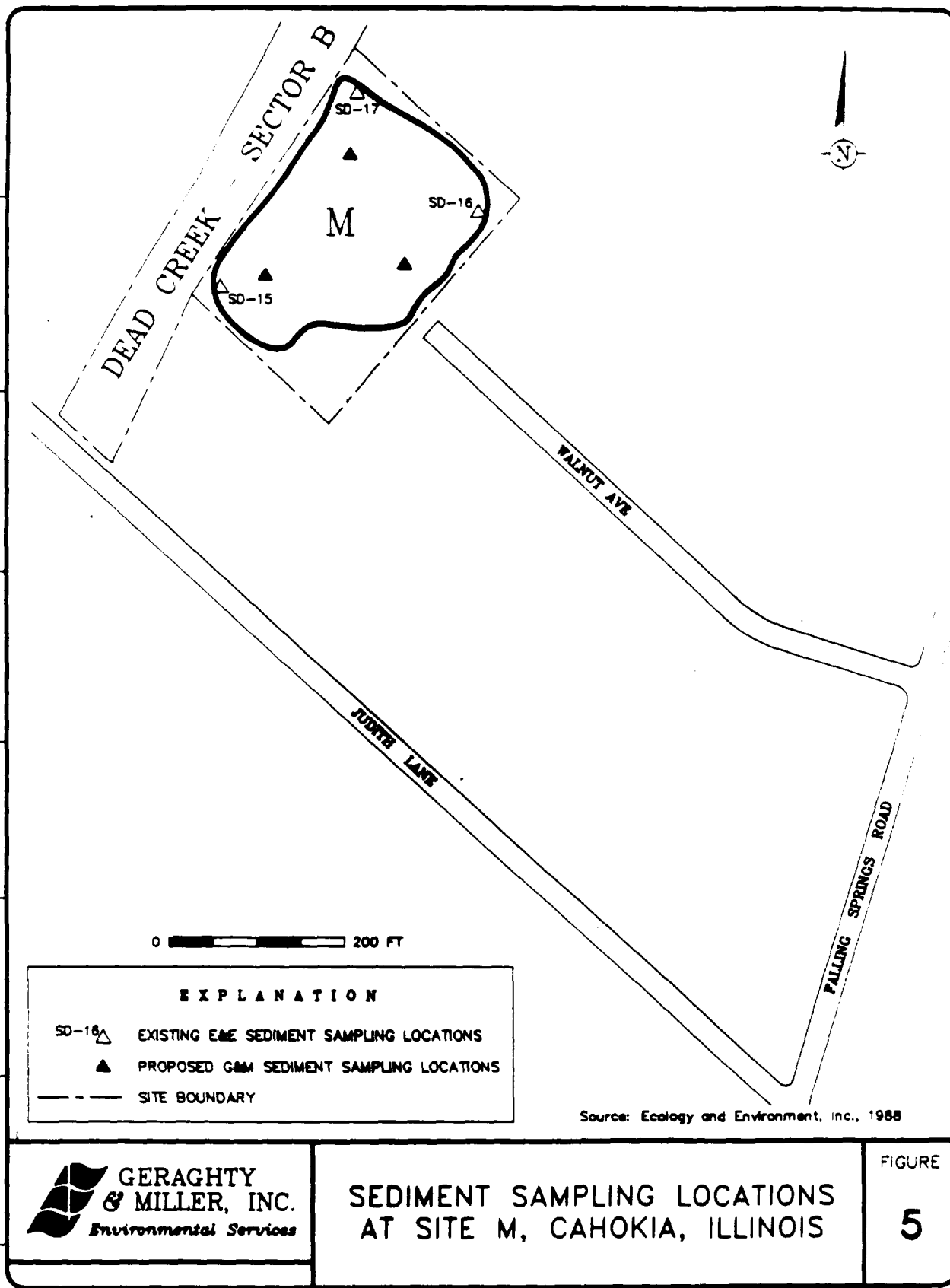
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DRAWING: SEBSWP

FILE NO.: 1444

PRCT NO.: NY60501

DWG DATE: 8-8-91



MCA 156902

DRAFTER: GS

APPROVED: BB

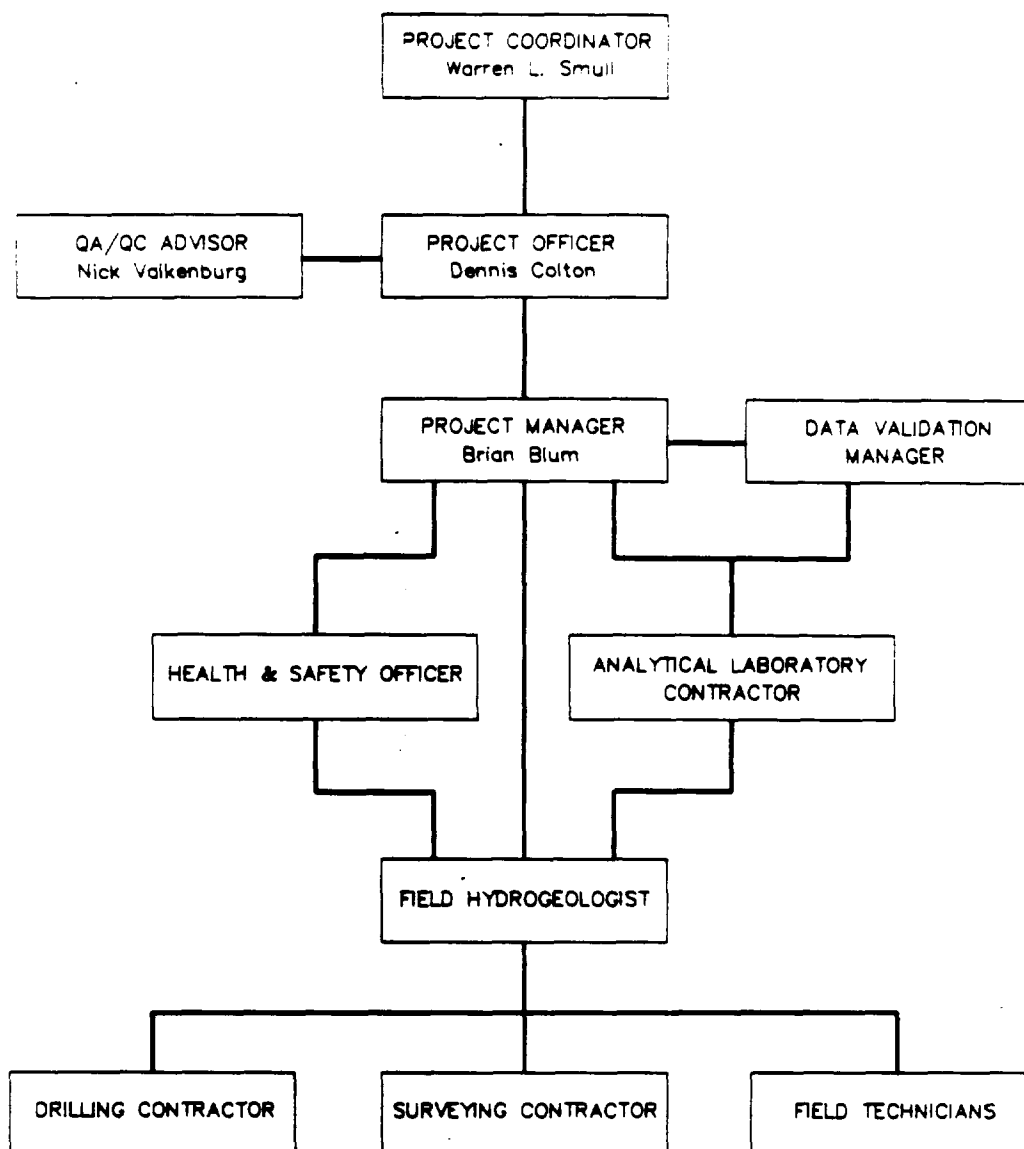
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FILE NO.: 1444

PROJECT NO.: NY80501

DWG DATE: 8-7-91



MCA 0156903



**GERAGHTY  
& MILLER, INC.**  
Environmental Services

## PROJECT ORGANIZATION

FIGURE

**6**

DWG DATE: 8 8 -91

PRJCT NO.: NY60501

FILE NO.: 1444

DRAWING: SB-SCHD

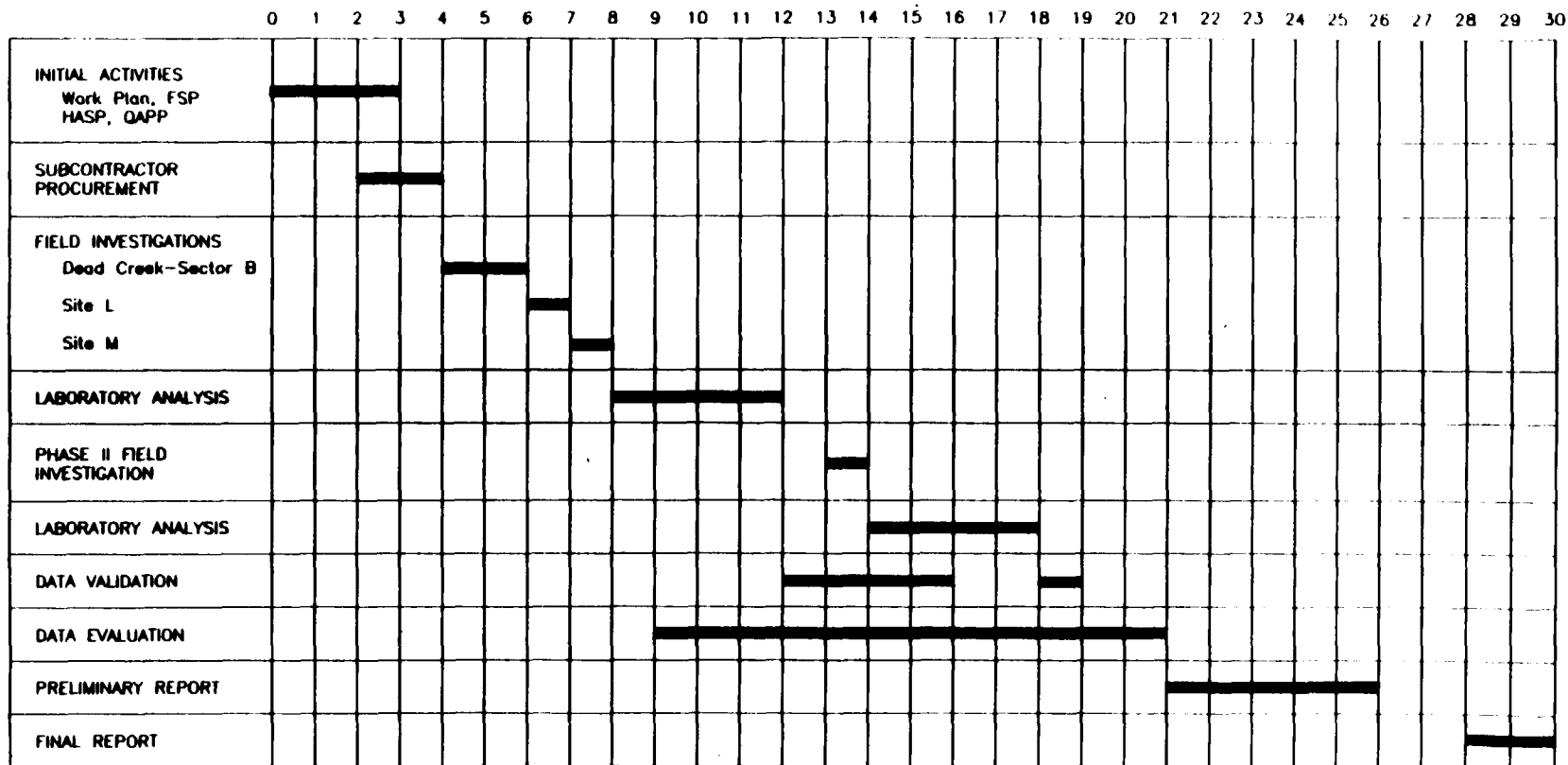
CHECKED: AN

APPROVED: BB

DRAFTER: GS

## Activities

## Time in Weeks



**GERAGHTY  
& MILLER, INC.**  
Environmental Services

PROPOSED SCHEDULE OF ACTIVITIES FOR THE SOIL BORING  
PROGRAM, SAUGET-CAHOKIA, ILLINOIS

FIGURE

7

EPA/CERRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE

MCA 2156904

Protected Material: Monsanto Insurance Coverage Litigation



APPENDIX A

MCA 0156905

EPA/CEPRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE